



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/650,569 | 08/30/2000 | Joseph E. Geusic | 303.390US3 | 9738 |

21186 7590 04/14/2003

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER

MALDONADO, JULIO J

ART UNIT PAPER NUMBER

2823

DATE MAILED: 04/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 09/650,569 | | GEUSIC ET AL. | |
| | Examiner | | Art Unit | |
| | Julio J. Maldonado | | 2823 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2/4/2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 39-72 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 31, 41, 43-46, 48, 50, 52, 53, 55, 57, 59, 60, 62, 64, 65, 67, 68, 70, 71 is/are rejected.
- 7) ☒ Claim(s) 40, 42, 47, 49, 51, 54, 56, 58, 61, 63, 66, 69 and 72 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The non-final rejection as set forth in paper No.18 is withdrawn in response to applicants' response.
2. A new rejection is made as set forth in this Office Action.
3. Claims 39-72 are pending in the application.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 39, 41, 43, 45, 46, 48, 50, 52 and 53 are rejected under 35 U.S.C. 102(b) as being anticipated by Prince (U.S. 5,431,775).

In reference to claims 39, 41, 43, 48 and 50, Prince (Figs.1A-J) in a related method of forming optical guides through a silicon substrate teaches forming a first and second functional circuit on a first surface of a semiconductor substrate (5) (column 2, lines 39 – 56), the second surface of the semiconductor surface being opposite the first surface; forming a hole (60) through the semiconductor substrate (5); forming an optical fiber having a silicon oxide cladding layer (30) having a first index of refraction and a core (80) having a second index of refraction greater than the first index of refraction in the hole (60), wherein the cladding layer (30) surrounds the core (80); and interconnecting the first and the second functional circuits together via the optical fiber (80) (column 2, line 7 – column 4, line 59).

In reference to claims 45, 46, 52 and 53, Prince teaches interconnecting the first and second functional circuits together including coupling a node of the first functional circuit to a first end of the optical fiber and coupling a node of the second functional circuit of the second functional circuit to a second end of the optical fiber, wherein one of the nodes comprises an optical transmitter and the other node comprises an optical receiver (column 2, line 7 – column 4, line 59).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Prince ('775).

Prince substantially teaches forming the core of a material having an index of refraction that is greater than the index of refraction of the cladding layer (column 4, lines 32 – 59). Prince fails to teach forming the cladding layer from a material comprising aluminum oxide. However, the examiner takes official notice that aluminum oxide is a common material within the fabrication of fiber optics and its selection involves common practice in the art. One of ordinary skill in the art would have been led to the selection of aluminum oxide as a material for the fabrication of the cladding layer through routine experimentation within the teachings of the process of the Prince to achieve a desired index of refraction.

8. Claims 55, 57, 59, 60, 62, 64, 65, 67, 68, 70 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prince ('775) in view of Gaul (U.S. 5,618,752).

In reference to claims 55, 57, 62, 67, 68, Prince (Figs.1A-J) in a related method of forming optical guides through a silicon substrate teaches forming a first and second functional circuit on a semiconductor substrate (5) (column 2, lines 39 – 56), the second surface of the semiconductor surface being opposite the first surface; forming a hole (60) through the semiconductor substrate (5); forming an optical fiber having a silicon oxide cladding layer (30) having a first index of refraction and a core (80) having a second index of refraction greater than the first index of refraction in the hole (60), wherein the cladding layer (30) surrounds the core (80); and interconnecting the first and the second functional circuits together via the optical fiber (column 2, line 7 – column 4, line 59).

Prince fails to teach forming the first functional circuit on a first surface of a semiconductor surface and forming the second functional circuit on a second surface of a second semiconductor surface; and bonding the first and second semiconductor substrates together. However, Gaul (Fig.5) in a related method to form an interconnect structure teaches forming a hole through a first semiconductor substrate (342); and forming an optical fiber (344) in the hole (column 11, lines 36-60). Also, Gaul (Fig.4P) in another embodiment of the invention teach forming a hole (320a) on a first semiconductor substrate (335a) and forming a second hole (320b) in a second semiconductor substrate (335b); bonding the first (335a) and second (335b) semiconductor substrates, wherein said bonding is performed such that the holes (320a

Art Unit: 2823

and 320b) are in alignment (column 11, lines 7-19). Therefore, it would have been obvious to one of ordinary skill in the form the optical fiber as taught by Gaul in the interconnect of Prince, since this would improve interconnections between devices (column 11, lines 36-60). It would also have been obvious to one of ordinary skill in the art at the time of the invention was made to bond the substrates as taught by Gaul in the interconnect formation method of Prince, since this would provide interconnection between devices (column 11, lines 36-60).

In reference to claims 59, 60, 64, 65, 70 and 71, the combined teachings of Prince and Gaul teach interconnecting the first and second functional circuits together including coupling a node of the first functional circuit to a first end of the optical fiber and coupling a node of the second functional circuit of the second functional circuit to a second end of the optical fiber, wherein one of the nodes comprises an optical transmitter and the other node comprises an optical receiver (Prince, column 2, line 7 – column 4, line 59).

Allowable Subject Matter

9. Claims 40, 42, 47, 49, 51, 54, 56, 58, 61, 63, 66, 69 and 72 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Art Unit: 2823

Prince (Figs. 1A-J) in a related method of forming optical guides through a silicon substrate teaches forming a first and second functional circuit on a first surface of a semiconductor substrate (5) (column 2, lines 39 – 56), the second surface of the semiconductor surface being opposite the first surface; forming a hole (60) through the semiconductor substrate (5); forming an optical fiber having a silicon oxide cladding layer (30) having a first index of refraction and a core (80) having a second index of refraction greater than the first index of refraction in the hole (60), wherein the cladding layer (30) surrounds the core (80); and interconnecting the first and the second functional circuits together via the optical fiber (80) (column 2, line 7 – column 4, line 59).

However, Prince neither teaches nor suggests forming the hole comprising forming an etch pit at a selected location of the first surface of the semiconductor substrate, and performing an anode etch of the first semiconductor substrate to form the hole at the location of the etch pit; forming the optical fiber with a hole running substantially along the center of the optical fiber; and lining the hole with a reflecting mirror prior to forming the cladding layer.

Response to Arguments

10. Applicant's arguments with respect to claims 39-72 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Papers related to this application may be submitted directly to Art Unit 2823 by facsimile transmission. Papers should be faxed to Art Unit 2823 via the Art Unit 2823


Art Unit: 2823

Fax Center located in Crystal Plaza 4, room 3C23. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2823 Fax Center number is **(703) 305-3432**. The Art Unit 2823 Fax Center is to be used only for papers related to Art Unit 2823 applications.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Julio J. Maldonado** at **(703) 306-0098** and between the hours of 8:00 AM to 4:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via julio.maldonado@uspto.gov. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.

Any inquiry of a general nature or relating to the status of this application should be directed to the **Group 2800 Receptionist** at **(703) 308-0956**.

JMR
4/5/03



George Fourson
Primary Examiner